THE GEODESIC NETWORK

1987 Report On Competition in the Telephone Industry

Prepared by Peter W. Huber as a consultant to the Department of Justice in accordance with the court's decision in the matter of U.S. v. Western Electric Company, 552 F. Supp. 131, 194-5 (D.D.C. 1982).

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MOBILE RADIO SERVICES

Cellular radio, conventional mobile telephone,[1] offshore radio service, rural radio service, specialized mobile radio, air-ground radio telephone, maritime mobile services, and paging services offer subscribers one- or two-way communications through mobile receiver units.[2] The geographic scope of any particular service depends on the location, height, and power of the individual transmitters contained in a mobile radio system, all of which are prescribed by FCC licenses.[3] The services vary widely in sophistication.

Each mobile radio service uses radio transmitters, mobile receivers and central control facilities. The central control facilities are connected on one side to the landline telephone network, and on the other to radio transmitters dispersed in the field to provide broad geographic coverage. Connection to the landline network is usually over dedicated access lines; connection to the field transmitter is over a land line or radio microwave facility.

Paging services convert a message initiated by a seven-digit, landline telephone call into a radio signal transmitted to a specified paging unit ("beeper"). The signal as decoded by the unit may be tone-only, tone-plus-voice, numeric, or alphanumeric.[4] A single transmitter

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[1] The FCC has assigned forty-four channels (eighteen in 150 MHz band and twenty-six in the 450 MHz band) for two-way common carrier mobile services. See 47 C.F.R. section 22.501(b). These channels were originally allocated separately between wireline and non-wireline licensees. This separate allocation scheme was eliminated in 1984. See, e.g., Elimination of the Separate Frequency Allocation Structure in the Public Land Mobile Services, 99 F.C.C.2d 311 (1984). In addition, the FCC has assigned twelve channel blocks in the 470-512 MHz band in certain metropolitan areas for two-way common carrier mobile services. See 47 C.F.R. section 22.501(k). The use of all two-way channels has declined in those major metropolitan areas where cellular radio services have been initiated. In these areas, the two-way channels are used to a greater extent for the provision of paging services.

[2] See generally 47 C.F.R 22.1 et seq.; 47 C.F.R. 90.1 et seq.; and 47 C.F.R. 94.1 et seq.

[3] See generally, 47 C.F.R. sections 22.100-22.121; 90.171-90.217. In addition, a common carrier mobile radio licensee must demonstrate the absence of interference with any user of the same frequency within certain prescribed distances. See 47 C.F.R. 22.15. The propagation characteristics of the various frequency bands allocated by the FCC for mobile radio services will differ depending upon the terrain. For example, a transmission on a VHF frequency (150 MHz) will travel further over a relatively flat terrain than an equivalent transmission on an 800 MHz channel.

[4] Responding to increased demand and to industry requests for additional spectrum, the FCC in the last four years has increased the number of common carrier paging channels from eight (four in 150 MHz band and four in 35/43 MHz band) to seventy-three, by adding twenty-eight channels in the 35/43 MHz band and thirty-seven channels in the 900 MHz band. As with common carrier two-way mobile channels, the paging frequencies originally were allocated separately between wireline and non-wireline licensees. In addition to permitting services provided on exclusive paging frequencies, the FCC's rules permit common carrier paging services on certain channels allocated for conventional mobile radio service, as long as the station has the technical capability to provide two-way services.

generally covers a radius of about twenty-five miles. Central control facilities connected to multiple transmitters by telephone lines or microwave facilities provide broader coverage.

Cellular radio is a high-capacity two-way mobile telephone service.[5] A cellular system is divided into numerous cells, each of which has its own, low-power transmitter operating on a subset of the 333 channels. The individual cells are all linked to a mobile telephone switching office (MTSO), which coordinates overall operation, and concentrates traffic for distribution among cells and with the public landline network. Access to and from long-distance services is generally through the local, landline exchange; a few cellular systems connect directly to interexchange carriers. A typical cellular system will cover between 75 and 100 percent of a Metropolitan Statistical Area, comprised of one or more urban areas and surrounding communities.

Most other mobile services are variations on these two models. Conventional mobile telephone services provide a service similar to cellular, using a lower-capacity technology suitable for low-density areas.[6] Maritime mobile radio units are used for communications between land stations and boats; air-ground mobile services are used between land and air stations; offshore mobile stations serve offshore locations in the Gulf of Mexico; rural radio stations serve locations unserved by

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(footnote(s) continued)
See 47 C.F.R. section 22.501.

[5] The Federal Communications Commission has authorized two cellular systems in each cellular geographic service area (CGSA). Cellular Communications Systems, 86 F.C.C. 2d 469 (1981). (The FCC generally based its CGSA delineations on an area's corresponding Metropolitan Statistical Area). The FCC's rules reserved one of the two licenses in each CGSA for the local wireline telephone company affiliate, while the second cellular franchise was made available to all other entities. Cellular Communications Systems, supra at 487-92. Many of the applicants for the second license have been radio common carriers. There were many applicants for the non-wireline authorizations in each of the top ninety markets, and the licensing of these systems, particularly in the top thirty markets, took longer than the licensing of the wireline systems. Non-wireline entry into the top ninety cellular markets has thus generally come six months to a year later than entry by the wireline system.

[6] To make a mobile-to-land call, a subscriber dials a number on the telephone handset in his vehicle. The handset scans the available channels (seven or twelve, depending on the area) to find one that is clear. The audio tones are converted to an FM radio signal, which is transmitted on the appropriate frequency to a base station antenna. This antenna separates and decodes incoming signals, and sends each signal by telephone wires or microwave to the mobile telephone switching office, which interconnects with the telephone company's local switch. From there, the call travels over the public switched telephone network to completion.

Service is provided over a single base station transmitter in each service area, which can send and receive signals over a twenty-five-mile radius; transmitters can be linked to provide broader coverage. The capacity of a conventional mobile radio system is defined by the number of frequencies. In general, each assigned frequency (or channel) can accommodate only one telephone call.

local landlines; and specialized mobile radio services provide two-way services to mobile units similar to cellular radio and conventional mobile radio services. Specialized mobile radio services possess neither the capacity nor the quality of cellular radio calls.[7]

Mobile radio services remain substantially more expensive than landline. Table MB.1. Nevertheless, in the past five years, rapidly improving technology and the development of competition have lowered both subscriber equipment and and service prices, in some instances by several hundred percent.[8] Most common carrier mobile services are intrastate, and therefore subject to state PUC regulation. Many but not all states have deregulated and detariffed common carrier mobile services. In a recent decision, the FCC detariffed interstate conventional mobile and paging services.[9]

Table MB.1. PRICE RANGES[10]

	One-Way	Two-way
Subscriber Equipment	$75-100	$800-4000[11]
Service Initiation	---	$0-50
Monthly Charges	$3.50-25	$5-60
Airtime	$.10-.65/page or flat rate	$0.14-2.00 /minute

[7] In addition to these mobile radio services, there are a variety of private land mobile radio services, including public safety radio, special emergency radio, industrial radio, land transportation radio, and radiolocation services. See generally 47 C.F.R. 90.1, et seq. Private radio services are restricted to eligible entities for each service. For example, a license for a private radio mobile station in the local government radio service may be issued only to "any territory, possession, state, city, county, town or similar governmental entity ...". See 47 C.F.R. 90.17(a). In addition, all private radio services except for specialized mobile radio and private operational fixed microwave are used for internal communications needs and cannot be offered to third parties on a for-profit basis.

[8] The most modern alphanumeric pagers, for example, use digital technology to encode and compress messages, making much more efficient use of available radio spectrum.

[9] RCCs nevertheless remain subject to the general statutory directive that they charge just, reasonable and non-discriminatory rates, and must answer to rate and other complaints filed with the FCC. See, e.g., Preemption of State Entry Regulation in the Public Land Mobile Service, CC Docket No. 85-89, RM-4811 (rel. March 31, 1986).

[10] Sources: RBOC and Telocator submissions.

[11] The price for subscriber equipment for air-ground services is $5000-$6000 per unit.

As prices have dropped, use of mobile services has mushroomed--approximately doubling, in all markets, every one to three years. The number of pagers in use nationwide grew from about 900,000 in 1979, to 2.2 million in 1982, to about 6 million today, and will grow to a projected 10 million in 1990. The new network paging services are expected to satisfy a pent-up demand of 350,000 subscribers, and a projected 1.5 million subscribers by 1990.[12] Cellular radio services arrived on the scene in 1984; between 350,000 and 450,000 customers subscribe today, and one projection is for ten million cellular subscribers by 1990.[13]

The technological frontier for all mobile services is regional and then national networking. Several foreign countries already have such systems in place.[14] In 1982, the FCC allocated new paging channels for the development of nationwide paging networks. Some RCCs have already begun to use microwave or satellite technology to connect transmitters for coverage that ranges from several counties to an entire state.[15] In August 1984, the FCC selected by lottery three organizations to establish nationwide paging networks by linking together local paging service providers to originate and terminate pages.[16] Nationwide paging systems are expected to come on-line in 1986.[17]

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[12] Estimates of subscription levels tend to vary widely: private and substantially deregulated providers do not readily supply this information. One March 1986 news account, for example, noted that a recent study by an industry trade group placed total cellular radio subscribership at the end of 1985 at just under 350,000, while another almost contemporaneous study estimated 250,000. See CTIA: Cellular Subscribership Tripled in '85, Communications Week 22 (Mar. 31, 1986).

[13] Traditional radio-telephone service has also grown, from 186,000 users in 1982, to 345,000 in 1985, with demand of 1.5 million expected by 1990. Cellular radio systems are, however, entirely displacing conventional two-way service in markets with concentrated demand.

[14] Canada, Japan, and Great Britain have each authorized nationwide cellular radio systems. See Cellular Radio Comes to Britain, European Telecommunications 8-9 (Jan. 1985); Yeutter and Smart Promise More Aggressive Trade Policy As Japanese Propose End to Tariff on Switches and Cellular Radio Equipment, Commerce Daily (June 27, 1985). Norway, Denmark, Sweden and Finland have established a mobile telephone system that serves the entire, four-country region. See The Nordic Mobile Telephone System Sets the Stage for Future Mobile System, Telephony, 54-56 (July 23, 1984).

[15] Wide-area paging does not yet represent a significant part of RCC revenues, and it is likely that demand for paging services will remain principally local.

[16] See FCC Grants Licenses to 3 Companies to Build Nationwide Paging Systems, Communications Week 23 (Aug. 13, 1984).

[17] Subscribers will be able to access these networks by dialing an 800 number. See Telocator, December, 1985, at 70. The network organizers are CyberTel Beep USA Nationwide Paging Partnership, National Satellite Paging, Inc., and Nationwide Paging Network.

Cellular licensees are similarly attempting to enlarge their systems' coverage through interconnection arrangements with other licensees. In creating the cellular service, the FCC stated that one of its primary goals was to encourage the nationwide availability of cellular service. Recent developments in cellular technology permit interswitch hand-off, so that a call in progress is not cut off when a customer moves from one MTSO's service area to another's.[18] Eventually calls will be handed off between MTSOs in much the same transparent-to-the-user way as they are now handed off between cells.

SUPPLIERS

Among the providers of mobile services are RBOCs, radio common carriers (RCCs) and private carriers. The FCC has repeatedly concluded that competition in the provision of mobile services is both vigorous and robust.[19]

Who provides which services where is governed in the first instance by three largely independent tiers of regulation.

The FCC, to start with, assigns radio spectrum. It authorizes mobile services under two regulatory schemes -- common carrier and private carrier.[20] The FCC has granted two cellular radio licenses in each market. It reserved one for the established, landline LEC, and

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[18] At present, a call is simply disconnected when a subscriber drives beyond the local cellular system's coverage area. If the adjacent region is served by another cellular system, the customer can redial the call. The call will be processed automatically by the second MTSO only if the carriers operating the two systems have a "roamer" agreement. Otherwise, the customer will be asked to supply the second carrier's operator with a credit card number for billing.

[19] See, e.g., Elimination of the Separate Frequency Allocation Structure in the Public Land Mobile Services, 99 F.C.C.2d 311 (1984).

[20] Common carrier services are regulated under 47 C.F.R. 22.1 et seq. Private land mobile services are regulated under 47 C.F.R. 90 et seq. A private carrier is permitted to offer commercial services only to subscribers who are eligible users under the FCC's rules for a particular private mobile service. See, e.g., Special Emergency Radio Service Rules, 47 C.F.R sections 90.33-90.55; Industrial Radio Service Rules, 47 C.F.R. 90.59-90.81. For certain private radio services, however, such as specialized mobile radio and private operational fixed microwave services, the eligibility restriction is only minimal and licensees are able to offer mobile services to customers that would otherwise obtain service from a common carrier mobile service. A private carrier generally provides the same services and uses the same equipment as a common carrier system. However, most private mobile radio frequencies may be shared by an unlimited number of licensees. See, e.g., 47 C.F.R. sections 90.75, 90.171-90.185. The FCC's rules currently prohibit SMR licenses from being awarded to any wireline common carrier. See 47 C.F.R. 90.352 and 90.603.

awarded the other among competing applicants.[21] The Commission has, however, allocated channels for use by multiple private and public providers of one- and two-way paging services. For example, in 1967, the FCC allocated one half of the "guardband" frequencies used for paging purposes to wireline telephone companies, the other half to the RCCs.[22] Private radio frequencies were allocated to eligible entities, which often did not include LECs.

Secondly, many mobile and paging services are intrastate. Many states regulate common carrier mobile services,[23] and some restrict new carrier entry by requiring a showing of public need for new service, a demonstration that existing service is not satisfying demand, or a showing that new entry will not harm existing carriers. Other states apply various technical, financial and public need standards that often delay, restrict or increase the costs of entry. Even in states with relaxed entry barriers, administrative processing delays can prevent state authorization for a year or more. In response to these regulatory restrictions, the FCC has preempted various state entry regulations for conventional mobile and paging services.[24]

Finally, the MFJ restricts the geographic range of mobile services offered by the BOCs. BOCs may provide intraLATA mobile exchange

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[21] See, Cellular Communications Systems, 86 F.C.C.2d 469 (1981), on reconsideration, 89 F.C.C.2d 58, on further reconsideration, 90 F.C.C.2d 571 (1982). In the FCC's view, the reservation of frequencies for wireline carriers "constitutes the most practical, and quite possibly the only, way to achieve the Commission's twin goals of making quality mobile telephone service available to the public as rapidly as possible while promoting competition whenever feasible." Memorandum Opinion and Order on Reconsideration, supra, 89 F.C.C.2d at 70.

[22] Amendment of Part 21 of the Commission's Rules, 12 F.C.C.2d 841 (1968), recon. denied, 14 F.C.C.2d 269 (1968), aff'd sub nom. Radio Relay Corp. v. F.C.C., 409 F.2d 322 (2nd Cir. 1969).

[23] Generally, the states do not regulate private radio services. Lately, however, a few states have sought to assert jurisdiction over private radio services, such as specialized mobile radio, that are offered to third parties on a for-profit basis.

[24] Preemption of State Entry Regulation of the Public Land Mobile Service, CC Docket No. 85-89, RM-4811 (rel. March 31, 1986). This decision was ultimately stayed by the Court of Appeals in view of the Supreme Court's recent decision in Louisiana Public Service Commission v. Federal Communications Commission et al., ___ U.S. ___ (No. 84-871, May 27, 1986). A court of appeals recently reversed the FCC's order preempting state entry regulation of common carrier paging services provided on FM subcarrier channels. See California v. F.C.C., ___ F.2d ___, (No. 85-1112, D.C. Cir. Aug. 22, 1986). In addition, the FCC has preempted state regulation of nationwide paging services. Memorandum Opinion and Order on Reconsideration (Part 2), 93 F.C.C.2d 908 (1983). The Commission recognized that state entry and technical regulation could impede the development of nationwide paging services by frustrating entry of network affiliates and by preventing the industry to develop national technical standards necessary to an effective nationwide paging network.

services of any description, inside or outside their own LATAs, but may not operate any interLATA mobile or paging services without obtaining a waiver.[25] Since divestiture, the regional companies have requested and received numerous clarifications and waivers permitting them to provide interLATA mobile and paging services and to expand the geographic scope of their mobile and paging services.[26]

Although there has been some consolidation among the RCCs in the last several years,[27] competition in the provision of paging services is especially vigorous.[28] Table MB.2. RCCs are now offering paging service in over 3700 communities throughout the United States. At present, almost 750 radio common carriers serve about 75 percent of the market. Many areas are served by multiple RCCs, particularly in states that deregulated RCC entry several years ago.[29] In the NYNEX territory, for example, there are forty paging companies providing service to over 500,000 pagers. RCCs also face the potential for competition from FM and TV broadcast stations, which can use their powerful transmitters to provide paging over subcarrier frequencies,[30] and from private paging

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[25] Before divestiture AT&T requested on behalf of the BOCs a blanket waiver permitting the BOCs to operate mobile systems without regard to LATA boundaries. In response to DOJ opposition, the waiver was modified to cover interLATA cellular radio operations in only nine specific geographic areas. On November 1, 1983, the Decree Court granted the waiver, subject to certain conditions. In its decision, the Court observed that market boundaries for landline services bear no technical or economic relationship to the natural boundaries for cellular markets. United States v. Western Electric Co., 578 F. Supp. 643 (D.D.C. 1983).

[26] See, e.g., United States v. Western Electric Co., 578 F. Supp. 643 (D.D.C. 1983) (Decree Court approved waivers permitting interLATA cellular service in nine markets where cellular systems, as approved by FCC, extended across LATA boundaries); Opinion, United States v. Western Electric Co., Civil Action No. 82-0192, (D.D.C., filed February 26, 1986) (approving waiver to permit Pacific Telesis to acquire Communications Industries, Inc.'s interexchange paging and conventional mobile telephone facilities, but requiring Pacific to dispose of interLATA microwave links used with these services). See also Orders dated June 20, 1986, (granting waiver requests by Bell Atlantic and Ameritech to provide interLATA paging services).

[27] Metromedia, MCCA, and Page America, for example, have been aggressively acquiring local paging and mobile radio operations.

[28] See, e.g., Elimination of the Separate Frequency Allocation Structure in the Public Land Mobile Services, 99 F.C.C.2d 311 (1984).

[29] For example, in Florida which deregulated entry in 1979, seven RCCs serve Daytona Beach, seven serve Fort Lauderdale and nine serve Miami.

[30] For example, American Diversivied Capital Corporations's Telecommunications Group announced it would begin offering the first nationwide paging service over FM radio broadcast bands in late 1985, using a portion of the broadcast spectrum used by CBS-affiliated radio stations in seven major markets around the country. See Nationwide Paging Service Announced, Communications Week 6 (Apr. 1, 1985). The technology for paging on FM and TV broadcast stations, however, has not developed as quickly as anticipated.

operations. The top eight RCCs account for only about 30 percent of all paging subscribers, while the top eight wireline carriers serve between 20 to 30 percent. Pacific Telesis serves approximately 10 percent of the paging subscribers, or about as many as Metromedia. The other six BOCs each serve about 2 to 4 percent of the market.

The most significant recent changes in RBOC participation in these markets have resulted from their acquisitions of RCC operations. Pacific Telesis bought the paging operations of Communications Industries, Inc., which was then the fourth largest provider with a 6 percent market share and operations in seven states. NYNEX purchased certain paging operations of Lin Broadcasting Corporation, the eleventh largest provider serving about 1 percent of the market.[31] Southwestern Bell is now proposing to acquire all of Metromedia's paging operations, which would make Southwestern the largest paging company in the country with about 14 percent of the nationwide market. BellSouth has executed an agreement with Mobile Communications Corporation of America (MCCA) to acquire 15 percent of that company. These acquisitions have extended BOC operations outside their regions, bringing BOCs into head-to-head competition with each other.[32] Figure MB.3.

Competition in cellular markets is developing rapidly. In the last four years the FCC has granted cellular radio licenses for both wireline and non-wireline systems in the top 120 markets. It has authorized the construction of wireline cellular carriers in another thirty to fifty markets. Wireline service is available in eighty-two of the top ninety markets, non-wireline in forty-six of the top ninety.[33] As of August 1986, both the wireline and non-wireline

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[31] Telocator Bulletin, February 14, 1986, at 5.

[32] Conventional mobile telephone services are available in over 2900 communities throughout the country. As in local paging markets, most areas are served by numerous mobile radio providers. Competition among mobile radio providers is significant. In many areas where cellular radio services have come on line the demand for conventional mobile services has diminished due to the greater reliability and quality of cellular services in comparison to the older two-way technology.

The BOCs are major providers of mobile radio services. Because of the FCC's original spectrum division among wireline and radio common carriers in the assignment of mobile frequencies, the BOCs were usually able to construct wide-area two-way networks covering vast geographic areas. For example, Pacific operates a state-wide, two-way service in California on the VHF two-way frequencies. As with paging and cellular radio services, some BOCs are seeking to expand their mobile operations outside their regions through the acquisition of RCC facilities.

[33] Wireline systems are leading the race because the FCC licensed them first. During the "headstart" period, the non-wireline operator will usually resell the wireline service, to develop a customer base that can be readily transferred to its own system once it becomes operational. The FCC has required cellular operators to permit the resale of their services by independent resellers. The FCC has also kept open the possibility of delaying the initiation of wireline carrier operations for up to six months. But the Commission has not in fact imposed the waiting period on any wireline carrier.

Table MB.2. PAGING SYSTEM OPERATOR MARKET SHARES
(1986 percent of pagers)[1]

	Non-Wireline
Metromedia[2]	10
Graphic Scanning	6
Mobile Communications Cor.	6
McCaw Communications	4
Paging Network	2.5
Page America	1.4
Metrocall	1
Ram Broadcasting	1
Crico Comm.	0.8
Communications Properties	0.8
Omni Communications	0.6
Qualicom	0.6
Radiofone	0.5
Message Center Beepers	0.3
Cox-Cybertel	0.3
Daniels and Associates	0.3
Answer Iowa	0.2
Others	33
Total Non-wireline	70
	Wireline
Pacific Telesis[3]	10
NYNEX[4]	3-4
Southeastern Bell[5]	2-3
Bell Atlantic	2-3
US West	2-3
BellSouth	2-3
Ameritech	2-3
GTE	1-2
Others	1-2
Total Wireline	30
Total Pagers	5,900,000

[1] Source: Radio Communications Report (March 15, 1986); The Eastern Management Group; and discussions with Telocator and RBOC representatives.

[2] Southwestern Bell has proposed to purchase Metromedia's paging interests.

[3] Percentage includes pagers acquired in merger with Communications Industries, Inc.

[4] Percentage accounts for the acquisition of Pageboy paging facilities.

[5] Percentage does not include proposed acquisition of Metromedia's paging interests.

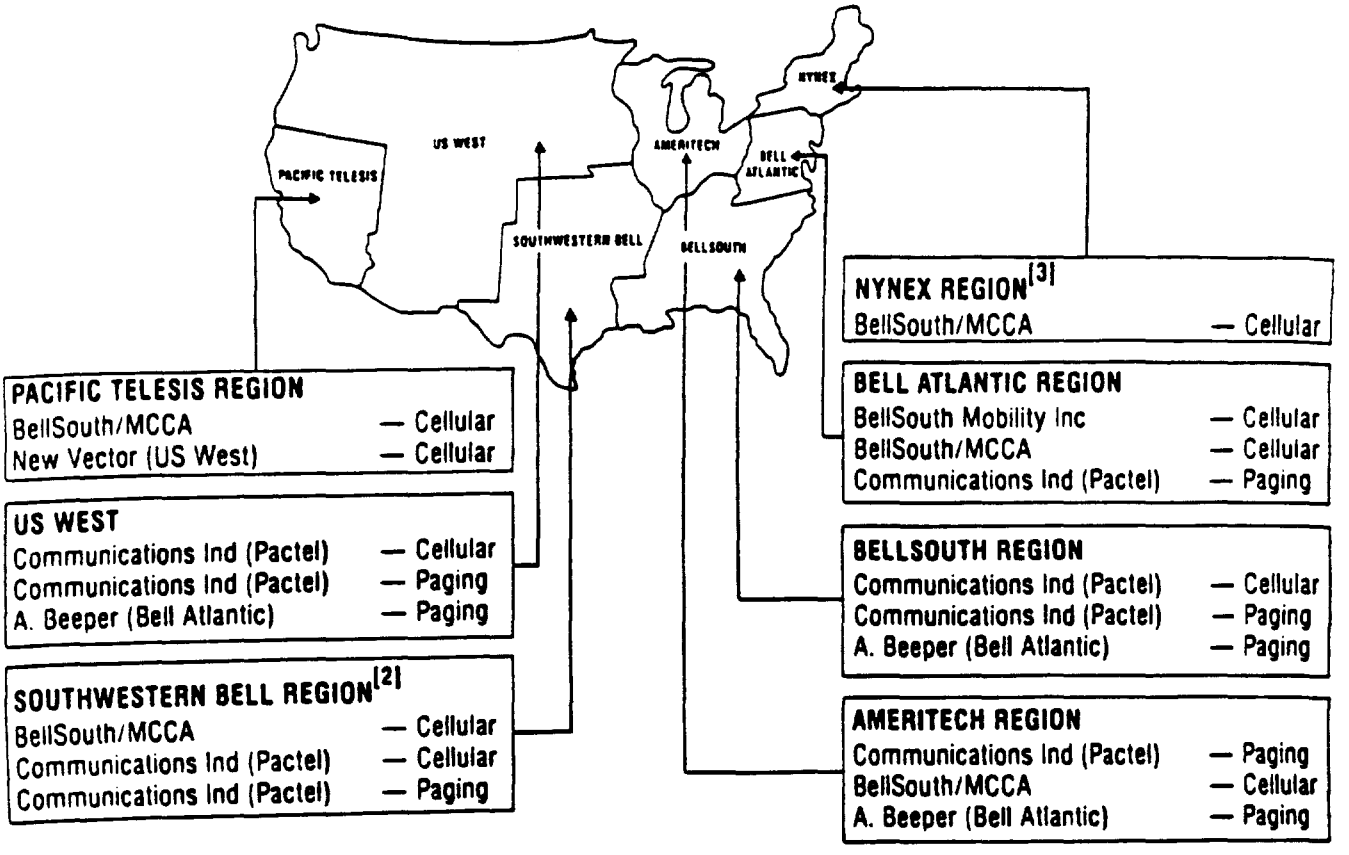

Figure MB.3. Mobile Competition Among Former Bell System Companies[1]

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[1] Source: RBOC submissions.

carriers were operating in nearly half of the top-ninety markets, and only one carrier was operating in almost forty of the top-ninety markets. In markets with two operating cellular systems, price and service competition is intense, at both the wholesale and retail levels.[34] There is also competition among resellers who purchase cellular service in bulk from the facilities-based carriers at wholesale rates and then provide service to their own customers.

The RBOCs and GTE are major providers of cellular radio services. Their LECs operate most of the cellular radio systems within their own regions. Within the last year, the BOCs have been increasing their presence in cellular radio services outside their region. Pacific Telesis, for example, now has equity interests in the non-wireline cellular systems in several out-of-region markets, including, Atlanta, Tampa-St. Petersburg, Omaha, Louisville, and Dallas. US West operates the non-wireline system in San Diego, where it competes head-to-head against Pacific's wireline system. Out-of-region competition among BOC cellular systems will increase significantly with Southwestern's pending acquisition of Metromedia's cellular interests in six out-of-region markets, and BellSouth's joint venture with Mobile Communications Corporation of America's cellular systems in twelve out-of-region markets.

While these consolidations are concentrating a large market share in former members of the Bell family, competition is not being visibly undermined; indeed, it quite possibly is being enhanced. Wherever they are permitted to, the RBOCs are competing vigorously against each other. No oligopolistic entent cordiale among the RBOCs has emerged.

ACCESS

All mobile radio services require access to the local exchange for the completion or initiation of mobile calls. Paging services are reached exclusively through the landline exchange.[35] And landline

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[34] In Chicago, for example, competition at the wholesale level focused on price and resulted in a rapid decline in rates. In the New York/New Jersey and Boston areas price competition has also been vigorous. NYNEX Mobile, for example, has discontinued airtime charges for incomplete calls, discontinued or reduced feature activation charges, introduced volume discounts, and offered demonstration periods.

[35] An RCC providing a paging service obtains trunk lines from the central office to the paging system terminal. Depending on the types of paging services provided, one trunk will often suffice for several hundred paging customers. A person initiating a page dials the receiver's local telephone number. The call is switched to the RCC paging terminal, and the LEC also transmits the last four digits dialed. The calling party may then transmit additional information by voice or using the telephone's touch-tone keypad. The RCC paging terminal relays the message (or simply the dialed-number for a tone-only pager) to the RCC's base station, usually over telephone company private-line circuits, and hence to the pager over the air. Some paging operators allow their customers to be paged toll-free from outside the local calling area. These operators use either foreign exchange service or INWATS, the equivalent of an 800 service.

phones outnumber mobile phones by three-hundred to one: a local call to or from a mobile phone is thus very likely to pass through the local exchange. LEC facilities are also used extensively to link cellular transmitters to the MTSO, and to link the MTSO to interexchange carriers for the completion of long distance calls.[36] Providers of mobile services must also obtain blocks of telephone numbers from the LEC to assign to individual receivers.[37]

Interconnection

LEC revenues from providing interconnection to competing mobile carriers are minimal compared with the revenues at stake in capturing a larger share of the mobile services market. Market factors alone therefore do not impose much discipline on LEC provision of local interconnection.

Regulation, on the other hand, is pervasive.[38] As far back as 1949, the FCC took note of the competitive advantages that inhere in a wireline carrier's control of local landline facilities.[39] In its 1967

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[36] Direct connection from a cellular switch to an IC's POP is possible over LEC-supplied lines or other dedicated transmission links. One of the first such arrangements was reportedly completed in February 1986, between NewVector, the cellular arm of U S West, and AT&T. See NewVector Signs Direct Connection Agreement with AT&T, Communications Week 29 (Feb. 3, 1986).

[37] In 1977 the FCC noted that interconnection issues between LECs and RCCs include RCC status as common carriers; reasonable interconnection terms and conditions by wirelines on reasonable request by RCCs; form of transmission over radio transmitter links; availability of seven-digit telephone numbers and charges therefor; effective liaison arrangements; elimination of maintenance charges; directory listing practices; rationalization of end user taxes; a plan for single-number access to one-way signaling systems related to usage; resale of INWATS service; compensation to RCCs for handling toll traffic and continued recognition of new technology and innovations. See Interconnection Between Wireline Telephone Carriers and Radio Common Carriers, 63 F.C.C.2d 87 (1977).

[38] The Decree Court generally deferred issues of interconnection of radio carriers to the FCC. See United States v. Western Electric, supra, 552 F. Supp. at 131, 196 n. 269 (D.D.C. 1982), aff'd mem. sub nom. Maryland v. United States, 460 U.S. 1001 (1983). When it granted early waivers to permit BOCs to offer limited, interLATA, mobile services the Court did, however, require the BOCs to offer each non-wireline licensee interconnection on the same terms and conditions, including price, as they provide to their own mobile radio systems. The Court also required the BOCs to lease all interLATA facilities for their mobile radio systems from interexchange carriers on the same terms available to competitors. See United States v. Western Electric Co., supra, 578 F. Supp at 651-652.

[39] See General Mobile Radio Service, 13 F.C.C. 1190, 1231 (1949). However, the FCC believed at the time that interconnection was best left to individual negotiations, and it exhorted the landline carriers to provide interconnection. AT&T and the local Bell Operating Companies nevertheless refused to provide interconnection to competing RCCs until 1960. In 1960 AT&T agreed with the National Mobile Radio System (NMRS) to interconnect RCCs upon a finding that interconnection would be in the public interest. But interconnection on this loose standard remained difficult to obtain. A complaint was filed by NMRS with the FCC and was pending for over 5 years.

assignment of spectrum for paging purposes the FCC adopted three specific "equal access" rules delineating the terms of competition between the wireline carriers (who received one half of the available spectrum) and the RCCs. Wireline carriers were required to offer the non-wirelines the same type of interconnection, at the same tariffs, and with access to the same discounts, as they offered to their own, mobile-service, affiliates.[40] These interconnection principles were subsequently extended to two-way mobile services as well,[41] and later formed the basis for the FCC's cellular interconnection requirements.

An FCC investigation into the Bell System's interconnection practices[42] resulted in a 1975 settlement agreement between AT&T, other wireline telephone companies, and the National Association of Radiotelephone Systems, that established interconnection standards and contained an "illustrative tariff."[43] The Commission currently requires

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[40] The FCC explained:

> The licensee shall offer to make available to the non-wireline carriers for one-way signaling purposes the same dial access interconnection facilities as those utilized by the wireline common carriers in the community: further that the charges for such interconnection, and all other facilities of the wireline company used by the non-wireline carriers in the one-way signaling service... shall be identical with those costs used by a wireline company... and finally, if a wireline carrier offers or purports to offer any free or reduced rate service in connection with its one-way signaling service, it shall provide the identical service so offered or purported to be offered to customers of any competing non-wireline carrier at the same reduced rate or free of charge.

See Amendment of Part 21 of the FCC's Rules, 12 F.C.C.2d 841, 852, recon. denied, 14 F.C.C.2d 269 (1968), aff'd sub nom. Radio Relay Corp. v. FCC, 409 F.2d 322 (2nd Cir. 1969.)

[41] Marine Mobile Radio, Inc., 63 F.C.C.2d 266, 269 (1977).

[42] AT&T (Offer of Facilities for Use by Other Common Carriers), 52 F.C.C.2d 727, 733 (1975).

[43] Interconnection Between Wireline Telephone Carriers and Radio Common Carriers, 63 F.C.C.2d 87, 89-95 (1977). The FCC identified the following principles underlying the industry settlement:

First, RCCs are entitled to interconnection on reasonable terms and conditions, including arrangements necessary to establish physical connections for the interexchange of traffic and other facilities an RCC requires for operation of its systems.

Second, RCCs are not to be considered end users of wirelines' services.

Third, RCCs are entitled to one-third of all interstate and intrastate toll message charges originating sent-paid from stations, or placed on a received-collect basis to stations, on their systems.

Fourth, wirelines should make available seven-digit telephone numbers for each paging device or two-day mobile unit of an RCC subscriber.

Fifth, BOCs should adopt a paging service plan, the charge for which is to be "more related to usage" than arrangements antedating 1975.

Sixth, BOCs must allow resale of their intrastate INWATS service by RCCs' paging operations, to the extent such resale is consistent with state tariff requirements.

By its terms, the 1977 Memorandum of Understanding was to expire on January 31, 1980. At the request of tne parties, it was extended until July 31, 1980, so that a new

all LECs to provide reasonable interconnection arrangements to mobile radio licensees for the provision of mobile radio service.[44]

The ongoing FCC regulation of cellular services illustrates the regulatory principles in practice. The interconnection issues for non-wireline cellular carriers center on the form of interconnection offered by the LEC and on access to telephone numbers issued by the LEC. In its 1982 Reconsideration Order, the FCC declared that its interconnection requirements were intended to provide competing carriers with "equal" or "equivalent" access to the local exchange network, "while permitting the carriers involved to negotiate specific interconnection arrangements to accommodate differences in cellular system design."[45] The FCC identified several specific interconnection standards, such as requiring every wireline carrier applying for a permit to describe its proposed interconnection plans with enough specificity to allow competitors to fashion similar interconnection arrangements.[46] At the same time, the FCC left wireline and non-wireline carriers free to negotiate other arrangements, as technological considerations warranted.[47]

Three basic types of interconnection arrangements are available to connect the cellular system's Mobile Telephone Switching Office (MTSO) to the local landline network. Type 1 interconnection treats the MTSO

(footnote(s) continued)

agreement could be negotiated. The new agreement, which the FCC accepted in October, 1980, Interconnection Between Wireline Telephone Carriers and Radio Common Carriers, 80 F.C.C. 2d 352 (1980), continued the terms of the 1977 MOU and added two new provisions. First, operating telephone companies agreed to lower their rates for central office numbers in recognition of the short duration of paging calls. Id. at 377-78. Second, AT&T agreed to implement a Single Number Access Plan, under which RCCs offering wide area paging services that transcend operating companies' exchange area boundaries could provide service with one paging number, resulting in lower costs. Id. at 378-79.

Just prior to divestiture, RCCs across the nation received notifications from the BOCs that agreements based on the 1980 Memorandum of Understanding would not be renewed after their termination in late 1983. In place of the negotiated agreements, the BOCs sought to impose access charges. Despite over five years of explicit recognition that RCCs are co-carriers, the BOCs attempted to justify such charges on the theory that RCCs were either end users or interexchange service providers. The FCC rejected BOC arguments in support of access charges for paging and conventional mobile radio systems stating that "RCCs are not end users except to the extent that they use exchange facilities for administrative purposes" and that RCCs "are not and should not be treated as interexchange carriers . . . . MTS/WATS Market Structure, 97 F.C.C. 2d 834, 882-83 (1984).

[44] See Amendment of Part 21 of the FCC's Rules, 12 F.C.C.2d 841 (1968), recon. denied, 14 F.C.C.2d 269, aff'd sub nom. Radio Relay Corp. v. FCC, 409 F. 2d 269 (2nd Cir., 1968); and Cellular Communications Systems, 89 F.C.C.2d 58, 80-82 (1982); Cellular Communications Systems, 90 F.C.C.2d 571, 576-577 (1982).

[45] Cellular Communications Systems, supra 89 F.C.C.2d at 81.

[46] Cellular Communications Systems, supra 89 F.C.C.2d at 81.

[47] Cellular Communications Systems, supra 89 F.C.C.2d at 82.

as a PBX served primarily by a single end office. Type 1 interconnection offers inferior transmission quality, does not permit arrangements under which interexchange carriers bill cellular subscribers directly for toll calls, and makes inefficient use of MTSO switching facilities. Type 2A interconnection treats the MTSO as a tandem switch, with links to a number of LEC end-offices and other carriers. This provides cellular carriers with lower interconnection costs, flexible collection of customer-specific billing data, flexible administration of a numbering plan, and improved transmission. Type 2B interconnection offers, in addition, direct MTSO interconnection with specific, high-volume end-offices. The MTSO routes the cellular traffic directly to other end offices and interexchange carriers and functions as a co-carrier.

For a period, several BOCs refused to provide Type 2 interconnection to non-wireline carriers. Non-wirelines were forced to choose between accepting Type 1 interconnection and delaying the start of service until the issue was resolved.[48] Numerous complaints were filed by non-wireline carriers with state PUCs and the FCC, and a few BOCs threatened to cut off interconnection altogether if non-wirelines refused to adhere to proferred contracts for Type 1 interconnection.[49]

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[48] Telocator claims that none of the BOC wireline affiliates have requested Type 2 interconnection. Telocator contends that the unanimity of approach by the BOC affiliates indicates their intention to sacrifice the aggressive development of cellular technology as a potential substitute for local exchange services.

[49] For example, Indiana Bell, a subsidiary of Ameritech, refused to connect the non-wireline, Indianapolis Telephone Company, on a Type 2 basis and the non-wireline went on line with Type 1 in January 1984. In late 1984, the BOC threatened to cut off the interconnection facilities if the non-wireline did not enter into a Type 1 contract that it had on the table, and the non-wireline filed interconnection complaints with the Indiana Public Service Commission and the FCC. As a result of its FCC complaint, the non-wireline received a partial settlement ten months later under which Indiana Bell acknowledged the non-wireline's right to Type 2 interconnection. See Indianapolis Telephone Company's Proposed Findings of Fact and Order. In the Matter of Emergency Petition of Indianapolis Telephone Company to Prevent Disconnection by Indiana Bell Telephone Company, Inc., filed with the State of Indiana Public Service Commission, Cause No. 37671, November 12, 1985; Stipulation of Partial Settlement--Technical Matters, filed with the Federal Communications Commission in E-55-5, October 11, 1985. The FCC recently dismissed a related complaint, finding no evidence that Indiana Bell had engaged in anticompetitive behavior. Indianapolis Telephone Company v. Indiana Bell Telephone Co. FCC File No. E-85-5 (rel. Oct. 16, 1986).

Ohio Bell, Cincinnati Bell and Wisconsin Bell would not give Type 2 interconnection to the non-wirelines in Akron, Cleveland, Cincinnati, Canton, Columbus, Dayton and Milwaukee, respectively. The negotiations with Ohio Bell had made no progress after twelve months of discussion, and Cincinnati Bell flatly refused to provide Type 2 interconnection. On November 13, 1985, six non-wirelines filed a complaint with the Public Utilities Commission of Ohio. In early 1986 both Cincinnati Bell and Ohio Bell formally acknowledged that Type 2 would be acceptable. In the interim, however, the Cleveland non-wireline was forced to go on line with Type 1 interconnection. In Milwaukee, the state PSC required the non-wireline to use Type 1 arrangements while the issue is being considered by the state PSC.

The BOCs also control the assignment of telephone numbers for use by radio carriers, and there has been significant controversy surrounding the assignment of these codes in the operation of their one-way and two-way services. Some RCCs have complained that the BOCs have hoarded these numbers for use by their own affiliates; others that the BOCs have made the numbers available only in inconveniently large blocks, still others that the numbers have been offered only in inconveniently small blocks.[50]

A recent FCC statement on cellular interconnection resolves numerous disputes that had developed between the LECs and non-wireline carriers, mostly in favor of the non-wirelines.[51] It requires all LECs to provide (1) Type 1 or Type 2 interconnection upon request; (2) interconnection to the non-wireline that is no less favorable than that furnished to the wireline cellular carrier; and (3) reasonable interconnection arrangements different from those used by the wireline company, if the non-wireline carrier chooses to negotiate with the telephone company.[52] In addition, the FCC prohibits the local exchange carriers from imposing recurring charges on non-wireline carriers for the use of NXX codes and telephone numbers.[53] The FCC limited such

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[50] In North Carolina, for example, the interconnection tariff filed by Southern Bell required the cellular carrier to pay a nonrecurring charge of $886.00 for the first block of twenty numbers and $14.50 for each twenty numbers thereafter. This would result in a total nonrecurring charge of $8,121.50 for the 10,000 numbers in the NXX code. This nonrecurring charge is 25 to 32 percent above Southern Bell's stated cost, which already includes a 14 to 15 percent rate of return. See Brief of Metro Mobile CTS of Charlotte, Inc., Proceeding to Consider Tariffs for Service Provided to Cellular Radio Telecommunications Companies, North Carolina Utilities Commission, Docket No. P-100, Sub 79, June 6, 1986, p. 23. Under the interconnection tariff filed by Southern Bell in North Carolina, the cellular systems can obtain numbers only in blocks of twenty at a time. Illinois Bell filed a tariff for Type 2 interconnection which required the cellular system to pay a one-time "service establishment" charge of $16,000.00 for furnishing the NXX code. Under the current Type 1 interconnection arrangement, the non-wireline had to pay a recurring monthly charge of 25 cents per number. See Protest and Request for Suspension filed by Rogers Radiocall, Inc. before the Illinois Commerce Commission, In the Matter of Illinois Bell Telephone Company's proposed Cellular Access Service, Advice No. 4487.

[51] See Memorandum Opinion and Order, The Need to Promote Competition and Efficient Use of Spectrum for Radio Common Carrier Services, FCC 86-85, FCC Mimeo No. 36487 (rel. March 5, 1986).

[52] See FCC Policy Statement on Interconnection of Cellular Systems, Appendix B to Memorandum Opinion and Order, supra.

[53] The Commission ruled that the BOCs do not "own" the NXX codes of 10,000 numbers each, which are assigned to the landline telephone companies. They merely have the responsibility for administering these numbers. As a result, BOCs can charge only for the reasonable initial connection charge, not the right to use the numbers. See FCC Policy Statement on Interconnection of Cellular Systems, supra para. 14.

charges only to a reasonable initial connection charge to compensate for the costs of software and other charges associated with new numbers.

Finally, the FCC has required wireline carriers to permit unrestricted resale of their cellular service.[54] This permits non-wireline carriers to enter the market as soon as wireline cellular facilities are operational, even if the non-wireline's are not yet in service. Resale rights also provide some measure of protection against price discrimination. And they largely guarantee that any operator seeking to create a national mobile network can obtain needed access wherever any wireline carrier is offering it.

Interconnection between paging operators and LECs is less complex and there have been no disputes between paging operators and LECs regarding the form of interconnection. Landline circuits are used to connect the paging terminal to the LECs' central office. Regular PBX-type trunks are usually used to connect the LEC end office to the paging office; one trunk will often suffice for several hundred paging customers because calls are obviously brief.[55]

Recent interconnection disputes between paging companies and the RBOCs have centered on the failure of the divested BOCs to renegotiate a "Memorandum of Understanding" that governed their relationship with the BOCs for many years.[56] The RCCs and most of the companies in the regions of Bell Atlantic, Pacific Northwest Bell, and Pacific Bell, have been able to reach new interconnection agreements, but many RCCs elsewhere continue to operate without such agreements.

Prices

Most mobile services remain intra-state, and the FCC has generally left to PUCs the task of overseeing the tariffs charged by LECs for carrier interconnection. The FCC thus deferred to the states to determine the permissibility of such arrangements as calling-party billing, responsibility for the costs of interconnection, and the establishment of rate centers. The FCC has nonetheless taken positions on more general aspects of RCC interconnection.

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[54] Cellular Communications Systems, supra, 86 F.C.C.2d at 510.

[55] Virtually all RCCs want only lineside interconnection between the LECs' central office and the RCCs' paging terminal. Some of the larger RCCs may eventually want trunkside access in markets with very high traffic volumes.

[56] The MOU, as described earlier, included general provisions establishing the RCCs' status as a co-carriers rather than end users. It addition, it outlined the RCCs' right to share in interstate and intrastate toll message charges that involved their mobile radio systems and to secure seven-digit numbers for assignment to paging and mobile radio units. Further, the MOU required the BOCs to adopt a paging service plan and to allow resale of their intrastate INWATS service by RCC paging operators, to the extent permitted by state tariff requirements.

A first issue of contention has been what RCCs should pay for facilities needed to interconnect their switches to the landline network. The FCC has insisted that tariffs charged to the non-wirelines be identical to those charged to wireline carriers.[57] It has also taken the position that non-wirelines are neither end users nor interexchange carriers, and should therefore not be assessed usage-sensitive access charges. RCCs do, however, pay for interconnection trunks, under tariffs approved by state PUCs.

Table MB.4 shows the range of prices for interconnection trunks and telephone numbers charged for cellular radio and paging services. Interconnection costs are typically 10 to 20 percent of mobile carrier's operating expenses, and operating expenses are typically 30 to 40 percent of total expenses. A mobile carrier's interconnection costs thus usually run from about 3 to 8 percent of total revenues. LEC ability to impede competition by manipulating interconnection prices for mobile services is therefore very much lower than for switched, interexchange landline services, where carriers pay more than 50 percent of revenues for LEC access.

Table MB.4. MOBILE INTERCONNECTION AND TELEPHONE NUMBER CHARGES

Mobile Service	Monthly Charge	One-Time Charge
Cellular Radio[58]	$50-$300 Per Trunk	$0.10-$2.00 Per Number
Paging System[59]	$30-$100 Per Trunk	$0.10-$2.00 Per Number

For paging systems, the LECs charge RCCs for connecting circuits between the central office and a paging terminal under a variety of schemes. Some LECs charge only local exchange rates; others a flat fee as for a private line; others the rates applicable to PBX trunks. The

[57] Some RCCs have nevertheless contended that LECs have charged their own mobile affiliates less for trunks than they charged non-wireline carriers. Telocator contends, for example, that in Indianapolis, Indiana Bell charged the wireline in which it owned a partnership interest less for trunks between May and August, 1984 than it charged the non-wireline. The FCC rejected the non-wireline operator's complaint, finding that the discrepancy in interconnection rates was the result of an inadvertent administrative error. Indianapolis Telephone Company v. Indiana Bell Telephone Co. FCC File No. E-85-5 (rel. Oct. 16, 1986).

[58] A cellular radio system in the top 45 markets typically requires 50-100 trunks from the LEC, one in second tier may require 30-50.

[59] A paging system operating in a major market typically requires 10-20 trunks from the LEC; the exact number depends on traffic volumes and how many radio control facilities are connected to the mobile carrier's switch.

LECs also charge private line rates for circuits connecting transmitters to the central control facilities.

Some BOCs, it is alleged, have unilaterally filed interconnection tariffs containing significant rate increases or offered contracts for RCC acceptance under threat of discontinued service.[60] Many RCCs continue to operate without any contract agreements.[61] The FCC, however, recently declined Telocator's request that the Commission appoint an interconnection ombudsman to address these problems.[62] Other RCCs have complained that LECs have proposed tariffs that will charge the same for Type 1 and Type 2 interconnection, even though Type 2 interconnection is less costly to the BOC.[63] Telocator also maintains that LECs require several of its members to pay a nonrecurring charges for numbers that are substantially above LEC costs. Prices charged by different LECs vary widely, as do minimum and maximum sizes of number orders. See Table MB.4. Review of LEC prices for telephone numbers is conducted by state, not federal, regulators.

There is, finally, the issue of reciprocal compensation. The non-wireline carriers argue that consistent with their status as co-carriers their cellular systems should be treated in the same manner as an independent telephone company and that co-carrier principles should govern the terms by which the non-wireline and the BOC compensate each other for the carriage of each others' traffic. Based on this argument, the non-wireline carriers contend that they should be compensated by the local exchange carriers for the completion of calls on the non-wireline

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[60] For example, in Minnesota, Northwestern Bell proposed a significant increase in interconnection rates for RCCs, rates that were ultimately set aside by the PUC. The LEC was directed to submit a new tariff with new cost studies. In the Southeast, where regional negotiations appear to have collapsed, Telocator cited BellSouth's plans to seek a 225 percent increase in charges for facilities and services provided to paging or two-way mobile radio systems.

[61] Telocator recently submitted to the FCC an Interconnection Report covering a total of forty-two states and the District of Columbia. Twenty-seven of these reported either that new interconnection agreements had been reached or that the RCCs were operating pursuant to the terms of the cancelled memorandum of understanding without any negotiations proceeding toward a new agreement. Ten additional jurisdictions reported that the terms of the cancelled MOU or interconnection contracts nevertheless continue in effect pending the outcome of hearings or negotiations. The remaining five jurisdictions report only that negotiations are under way to reach new agreements. See Memorandum Opinion and Order, The Need to Promote Competition and Efficient Use of Spectrum, F.C.C. 86-85, released March 5, 1986, para. 13.

[62] Memorandum Opinion and Order, The Need to Promote Competition and Efficient Use of Spectrum, F.C.C. 86-85, released March 5, 1986. The FCC concluded that Telocator had not demonstrated any widespread BOC disregard of the FCC's interconnection requirements, nor that any BOC was negotiating in bad faith to resolve remaining interconnection issues.

[63] For example, a complaint is pending before the Texas Public Utilities Commission contesting Southwestern Bell's proposal to that effect.

cellular system. In effect, the non-wireline carriers are seeking a reduction in the flat rate fee that they pay the LECS for circuits between the MTSO and the local exchange. A few BOCs have entered into agreements that provide for reciprocal compensation; most have insisted on treating the non-wirelines as end-users, and charging them for all costs incurred by the local telephone networks in carrying calls to and from cellular subscribers.[64]

Access to Network and Customer Information

Mobile carriers are potentially susceptible to the same problems as ICs in regard to LEC provisioning and maintenance of service, and alteration of network standards.[65] A related issue concerns BOC access to customer proprietary information generated through their local exchange operations. In supplying landline access to RCC competitors, BOCs gain access to RCCs' business and growth plans, in much the same way as they gain access to landline IC plans. As discussed in the Interexchange Communications section of this report, various standard-setting procedures and FCC regulations provide some measure of protection against LEC abuses of this type.

Competitive Assessment

Head-to-head competition between LECs and non-wireline RCCs in the provision of local mobile services raises many questions about discriminatory access to the LEC exchange.[66] The FCC has addressed the interconnection issues quite comprehensively. Complaints are abundant. The radio common carriers and non-wireline cellular operators have generally fared remarkably well in the regulatory process, though as a group state regulators have been less attentive than the FCC in shaping the rules under their jurisdiction to promote competition. Nonetheless, competition in providing local mobile services appears to be both vigorous and robust.

The principal interconnection challenges in the next few years do not involve access to the landline exchange, but rather interconnection between mobile carriers themselves. The ultimate goal is to offer cellular users the ability to get mobile service anywhere in North America immediately upon going off-hook. This will require rapid

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[64] The MOU provided for some reciprocal compensation by entitling RCCs to one-third of all interstate and intrastate toll message charges originating sent-paid from stations, or placed on a received-collect basis to stations, on their systems. Interconnection Between Wireline Telephone Carriers and Radio Common Carriers, 63 F.C.C.2d 87, 89 (1977).

[65] Several non-wireline carriers, for example, claim they have suffered unexplained delays in the provisioning of interconnection circuits necessary for the continued operation of their systems.

[66] The problems are undoubtedly every bit as large (in the context of this small market) as the interconnection problems encountered by landline interexchange carriers in the context of their much larger one.

exchange of billing information and credit authorization between carriers, in a process transparent to the subecriber. The consensus in the industry is that there are still major technical and administrative problems to overcome in realizing this objective.[67]

The MFJ's LATAs were intended to define the boundaries of what was perceived to be a natural monopoly for landline service. Mobile services are clearly competitive at all levels, both intra and interLATA. LATA boundaries are thus irrelevant to mobile network architecture or natural-monopoly economies of providing mobile service. There is no reason to believe that enforcement of LATA boundaries on RBOC-supplied mobile services promotes fairer competition in the mobile communications markets.[68] And while direct competition between BOCs and non-wireline mobile carriers does raise serious questions about discriminatory access, there is also no reason to suppose that BOC involvement in interLATA mobile services will aggravate those problems.[69] To the contrary, the BOCs and Bellcore might be well positioned to play a major role in resolving the difficult standardization issues that are currently slowing development of national mobile networks.[70]

COSTS

A separate competitive concern is that BOCs might impede competition not by discriminating in the access they provide, but by cross-subsidizing their own (by hypothesis) less efficient mobile operations.

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[67] See CTIA Panel Discusses Solutions to 'Roaming' Problems. Communications Week 31 (June 9, 1986).

[68] There is some possibility that keeping LECs out of interLATA services of every description promotes more equitable LEC treatment of landline interexchange carriers, by preventing any form of head-to-head competition between LECs and ICs. For the present, mobile services have far too little capacity to pose any serious competitive threat to landline ICs: the risk of a LEC discrimination against AT&T or MCI for the purpose of promoting interexchange services through a LEC's mobile affiliate is fanciful. That risk may become real when mobile services offer a viable alternative gateway in and out of local markets. But at that point, with two mobile carriers operating in each local market, the LEC bottleneck will have disappeared.

[69] At least one of the national paging networks, for example, is accessed through an 800 code, and LECs are not positioned to discriminate among individual 800 users. See Nationwide Paging Service Announced. Communications Week 6 (Apr. 1, 1985).

[70] As of April 1986, the Electronic Industries Association had reportedly been unable to arrive at standards that would allow handoffs among competing manufacturers' mobile switches. Estimates of when a protocol will emerge range from the end of 1986 to 1987 or 1988. See New Opportunities for System Equipment Vendors. Communications Week 23 (Apr. 21, 1986). This is a matter that the pre-divestiture Bell system would have resolved quickly, smoothly, and no doubt to the complete satisfaction of wireline (but not non-wireline) carriers.

The main opportunities for cross-subsidy come from operations that are common to providing both landline and mobile services. Profiles of the various expenses incurred by paging and mobile telephone companies were developed in a 1983 study by Telocator. Table MB.5.

Table MB.5. TYPICAL PROVIDER COSTS[71]
(as a percent of annual revenues)

	Paging Companies		Mobile Tel. Companies		Cellular Companies
	W/L	NW/L	W/L	NW/L	
Operating Expenses[72]	25-28	35-40	25-28	40	30-40
Selling Expenses[73]	45[74]	11	45	10	10-15
Administrative Expenses[75]	10	28	10	30	15-25
Interest Expense	0	4	0	2	5-7
Depreciation	8	14	8	12	10-20
Before Tax Earnings	12	3	12	6	15-20

Facilities, including central control stations, transmitter and antenna equipment, and mobile units for leasing to subscribers, offer few opportunities for cross subsidy, but also account for a comparatively small fraction of total costs. Interconnection trunks between the central mobile switch and the public switched network, and between the central switch and remote antenna sites, are somewhat more problematic, although it appears to be a fairly simple regulatory matter to ensure that LECs charge their own mobile affiliates the same as they charge non-wireline carriers. Sales, administration, billing, and maintenance, and other general operating costs provide the major opportunities for cross subsidy. Telocator estimates that (including interconnection costs), some 30 to 40 percent of a mobile carrier's

[71] Source: Telocator submission. Cellular company estimates were derived through discussions with Telocator and RBOC representatives.

[72] Includes salaries of operating personnel, interconnection costs, equipment costs, maintenance, antenna lease expenses, equipment lease expenses, utilities, and related expenses.

[73] Includes advertising and related expenses.

[74] The selling expenses for wireline paging companies is significantly higher, almost 45 percent of annual revenues, because most wireline paging companies contract with agents to sell and market their paging services.

[75] Includes salaries of administrative personnel, supplies, insurance, rent, and related expenses.

...tal costs are vulnerable to misallocation if shared with LEC ...erations.[76]

Market Factors

Whether intra-RHC cross-subsidy could have any significant anti-competitive impact on the provision of mobile services depends in part on other providers' ability and incentives to respond in kind. Who are the (presumptively more efficient) providers who might be driven out of the market by cross-subsidized competition from the RHCs?

In increasing numbers they are other telephone companies and RHCs, who possess similar incentives (if not quite the same abilities) to cross subsidize their mobile operations.

In ten of the top ninety cellular markets, for example, the wireline (LEC) carrier is currently competing against a non-wireline carrier in which a BOC possesses an ownership interest. This type of overlap will increase with Southwestern's pending acquisitions of parts of Metromedia, and BellSouth's joint venture with MCCA.[77] If and when these acquisitions are completed, the wireline cellular carrier will compete against a LEC-affiliated non-wireline carrier in nearly thirty of the top-ninety markets.

Most of the competition in the paging markets, on the other hand, is still between LECs and independent RCCs, though head-to-head competition between LEC-affiliated companies has been increasing here too, as a result of BOC acquisitions of out-of-region RCC operations.

Regulation

The principal regulatory protections against cross-subsidy in these markets have taken the form of separation requirements. In 1981 the FCC required wireline carriers to offer their cellular services through separate subsidiaries;[78] that requirement was extended with

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[76] Telocator emphasizes that LECs can engage in a wide variety of anticompetitive joint marketing activities combining local exchange services with paging and mobile radio products. For example, when companies place telephone service requests, they often are given sales presentations for paging and mobile services. BOCs can advertise their competitive services on the cover of local telephone books and in other sections that are not for sale to competitors. In addition, BOCs can refer general inquiries about paging service to their own paging departments.

[77] RBOCs have been establishing out-of-region cellular operations under MFJ waiver for some time, and the recent A-Beeper decision will henceforth permit them to do so without waiver. See United States v. Western Electric Co., et al., No. 86-5118 (D.C. Cir August 15, 1986).

[78] Cellular Communications Systems, supra, 86 F.C.C.2d at 491.

minor modifications, to the post-divestiture RHCs.[79] The FCC does not, however, require BOCs to provide paging and conventional mobile services through a separate subsidiary.[80] For its part, the MFJ does not require any separation of intraLATA mobile operations. But the Decree Court's waivers for interLATA RBOC cellular services were made contingent on the use of separate subsidiaries.[81] Between paging and cellular, and intraLATA and interLATA operations, there are thus four service combinations, on which two regulatory authorities (the FCC and the MFJ/Decree Court) impose three quite different separate-subsidiary requirements. Table MB.6.

Table MB.6. SEPARATE SUBSIDIARY REQUIREMENTS

	MFJ	FCC
Cellular		
IntraLATA	No	Yes
InterLATA	RBOCs Barred	Yes
Paging		
IntraLATA	No	No
InterLATA	Yes. Per Waiver	No

Competitive Assessment

In both their geographic scope and in the nature of the operations, mobile services present quite large possibilities for LEC cross-subsidy, at least when compared with other service and equipment markets. Whether market and regulatory factors permit wireline providers of mobile services to gain a significant competitive edge from cross subsidy is much less clear. Interestingly, LECs themselves--who are presumably experts on the competitive advantages of home-turf cross subsidies--remain quite willing to compete against other LECs in out-of-region provision of mobile services.

An RBOC's ability to cross-subsidize mobile operations is not seriously contained by the MFJ's LATA-boundary restrictions. Permitting

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[79] Policy and Rules Concerning the Furnishing of Customer Premises Equipment, Enhanced Services and Cellular Communications Services by the Bell Operating Companies. 95 F.C.C.2d 1117, 1120 (1983).

[80] Paging Systems. 89 F.C.C.2d 1337 (1982). The FCC also rejected proposals to require separate books for wireline paging and conventional mobile operations. Recently, however, the FCC amended its rules to permit BOCs to combine their provision of cellular services with other common carrier mobile services.[55] In response, Ameritech, NYNEX and US West have either initiated efforts or have been granted permission to consolidate their mobile service activities within their structurally separated cellular subsidiaries.

[81] See United States v. Western Electric Co., 578 F. Supp. 643 (D.D.C. 1983).

the RBOCs to extend their mobile operations across LATA boundaries would not noticeably increase their ability to impede competition in mobile markets through cross subsidy.